Engineering & Computer Science BITS

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New Software Engineering Programme Planned for Concordia University

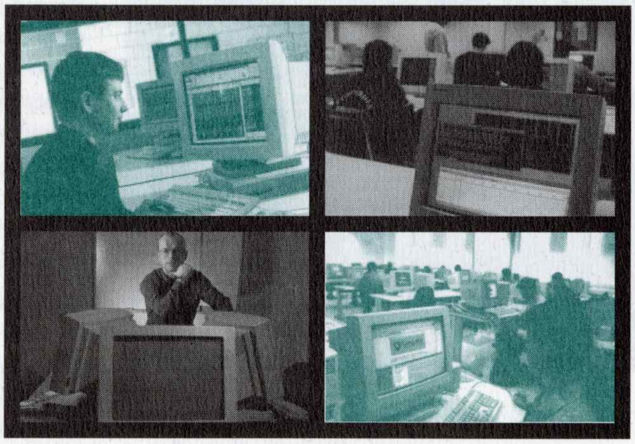
Faculty of Engineering & Computer Science poised to meet the high demand for Information Technology Specialists in Quebec and Canada

In response to the growing need for specialists in the field of Information Technology (IT), Concordia will introduce a new Software Engineering undergraduate program beginning January 1999.

With an intake of 50 students per year, Concordia has the unique opportunity of launching the only undergraduate program of its kind in Quebec .

By definition, Information Technology includes the fields of computer science, computer engineering and software engineering. Although many Quebec universities have undergraduate programs in both computer science and computer engineering, the market demand for IT specialists far outweighs the province's current supply. One estimate puts Quebec's total annual output at 350, while the demand for such specialists is between two and three thousand. In Canada alone experts estimate that over 20,000 positions will need to be filled in the near future. The demand is particularly unmet in the area of software engineering. Currently, Quebec industry relies on recruiting software engineers from the middle and far east as well as eastern Europe.

At Concordia both the Department of Computer Science and all Engineering Departments are housed within the Faculty of Engineering & Computer Science. This illustrates a strong synergy between both Concordia's engineers and computer scientists. Armed with one of the best computer science and computer engineering departments in the province, Concordia seems poised to develop this much needed program.



Quebec seems a logical setting for the birth of this new initiative. Not only does Montreal possess one of the most active high technology markets in Canada, it is also ranked among the top 10 high-tech cities in North America. With companies such as Ericsson, SoftImage, Discreet Logic, CAE, SNC Lavalin, Bombardier and Pratt & Whitney operating out of Quebec, the province offers fertile ground for software engineering graduates.

As it stands, the provincial demand for information technologists is currently running at more than twice the supply. In consequence, this shortage has begun to have adverse effects on the Quebec economy. Introducing this program would not only help alleviate this shortage but would also establish Concordia as Quebec's leading academic institution in the area of Information Technologies.

The joint development of Canada's only computer animation program with the Faculty of Fine Arts in September 1997 was the first step in catering to the needs of Quebec's high tech industry. With this most recent development, Concordia continues its trailblazing trend with the creation of yet another unique and highly needed engineering program.

The programme proposal was recently approved by the Engineering & Computer Science Faculty Council and now awaits approval from University Senate which meets later this month.

Innovative Projects Help Expand the Borders of Applied Industrial Engineering

Concordia's Dr. Akif Bulgak involved in the application of industrial engineering concepts to railway traffic systems and ship operations management

Conveyor belts and factory production lines are what many people envision when they think of industrial engineering. From Coca-Cola bottling factories to General Motors Auto Assembly Lines, both their systems operations and efficiency levels are maintained by industrial engineers. In fact, design optimization of assembly lines and their productivity are concepts industrial engineers are constantly seeking to improve.

Now Imagine taking these same concepts and applying them to inherently different settings with the same goal in mind, namely improving efficiency. This is what Dr. Akif Bulgak, Industrial Engineering professor at Concordia University is in the process of accomplishing.

Dr. Bulgak, whose research involves the optimization of manufacturing/assembly systems, specifically looks to create "robust" systems which would be able to maintain close to optimal productivity in the event of an unanticipated disturbance. In the context of an assembly line this disturbance could be the shutdown or malfunction of a specific work station or assembly line component.

In creating a robust assembly line, Dr. Bulgak ensures that if a specific area shuts down, the assembly line will still be able to continue processing a given product while that area is being fixed by having objects rerouted to functioning work stations rather than have the entire system stall.

Using this same rationale, Dr. Bulgak has extended these strategies to two non-conventional areas where the products are humans and sea vessels respectively, rather than automobiles or other traditional factory products.

The first project focuses on the time-table optimization of high density railway traffic systems in collaboration with British hi-tech company Transportation Technologies. Using real-world data supplied by the London Underground subway system and British Rail, Dr. Bulgak is examining ways to make these systems more efficient in terms of the time it takes to transport commuters.

According to Dr. Bulgak, the longer a given commuter is in the system, the more congested the environment becomes and the higher the risk of accident in addition to increasing system operating costs and decreasing customer satisfaction. " Transit systems are very similar to traditional manufacturing systems. In a manufacturing system you are transfering parts through work stations. In subway systems, work stations can be seen as stops on a subway line, passengers as parts and trains as conveyor belts".

The London Underground Railway is one of many mass transit systems to benefit from industrial engineering efficiency optimization research

In examining things such as subway shutdowns, Dr. Bulgak relies on historical data to predict the frequency of shutdown and how each particular system can be constructed to reduce this risk.

The ultimate goal of this project is to convert this particular study into a universally-applicable optimization software that complex mass transit railway systems could use to improve their operations.

The second project undertaken by Dr. Bulgak focuses on the optimization of merchant vessel operations. Along with research colleagues from the University of New Orleans, Dr. Bulgak developed a pilot-project in the United States which features the compilation of data from merchant vessels through a satelite to a joint data-base. Ships provide their individual data via on-board computers and subsequently have access to all data provided by other ships to help with their own operations. Specifically this data measures their reliability and maintainability during daily operations to better predict such things as the longevity of specific equipment/parts, the risk of breakdown, the delay of breakdown etc.. Armed with this information, individual ships may improve their operations by knowing when certain equipment should be replaced or how their ship will react in a specific situation based on the historical data provided by other ships of the same or similar construction. Data would also be fed to shipyards to ensure design improvements in newer models.

According to Dr. Bulgak, this project is extremely important as 75% of all world goods are transported by ship. Optimizing their operations would not only improve their efficiency but would also safeguard against ecological disasters brought about by oil tanker breakdowns or malfunctions.

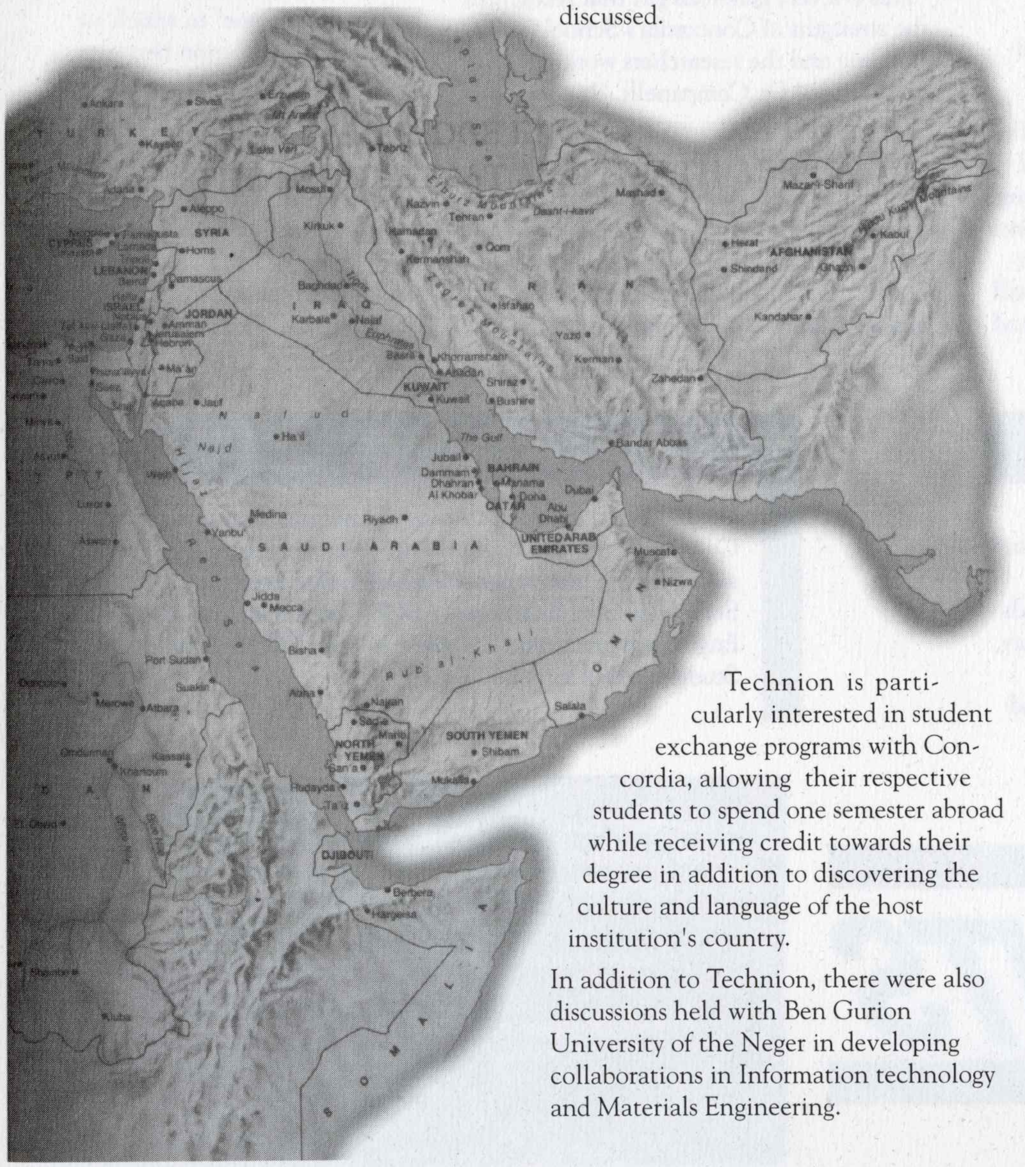
This project was well received by the United Nations International Maritime Organization after its presentation to the U.S. Merchant Marine Academy and may be internationalized as a result, with the first natural extension of the project possibly being to Canada.

For further information on these projects please contact Dr. Akif Bulgak at (514) 848-3161 or via e-mail: bulgak@vax2.concordia.ca

Faculty Strengthens Its Ties To the Middle East

Academic Institutions in Israel, Palestine, Jordan and Egypt eager to collaborate with Concordia

Dr. Nabil Esmail, Dean of the Faculty of Engineering & Computer Science joined a delegation from Concordia University headed by Rector Frederick Lowy on a trip to the Middle East last January. The primary purpose of the visit was to strengthen already existing agreements and establish new collaborations with Concordia's counterparts in the Middle East. Numerous discussions took place, with a definite interest in the areas of high technology exhibited by Israel, Palestine, Jordan and Egypt.



ISRAEL

An agreement of cooperation was established in February, 1997 between the Faculty of Engineering & Computer Science and Israel's Technion Institute of Technology in the area of Building Studies. The possibility of widening this collaboration to other areas of engineering (mechanical and electrical) as well as the area of Information Technology, encompassing computer science, computer engineering and software engineering, was discussed.

Technion is particularly interested in student exchange programs with Concordia, allowing their respective students to spend one semester abroad while receiving credit towards their degree in addition to discovering the culture and language of the host institution's country.

In addition to Technion, there were also discussions held with Ben Gurion University of the Neger in developing collaborations in Information technology and Materials Engineering.

PALESTINE

Bethlehem University (BU) expressed an interest in collaborating with Concordia in the area of Website Design. An agreement was also reached to assist BU in the development of Computer Technology curricula as well as in Computer Science Diploma Programs.

Concordia representatives also met with Al Najah University administration who were interested in developing their Chemical Engineering curricula.

JORDAN

Concordia has maintained an agreement with the Jordanian University of Science and Technology (JUST) through the Canadian International Development Agency (CIDA) since 1994. This current agreement focuses on improving Manufacturing Technologies in Jordan and has a year and a half remaining until its completion. There was a strong interest in renewing this agreement while broadening its scope to include Information Technology.

EGYPT

Cairo University (CU) expressed interest in establishing a cooperative agreement with Concordia University's Faculty of Engineering & Computer Science and Montreal-based CAE Electronics. CU's Information Technology Departments would send their students to Concordia to train as Post-Doctoral Fellows while working at CAE during their training period.

Ain-Shams University was also interested in a similar agreement, with the inclusion of engineering training as well. CAE would also be involved as a third party for Information Technology training of visiting students.

Revolutionary Software Developed to Assist in Crane Selection

Innovative computer program developed by researchers at School for Building and GUAY Inc. helps construction industry improve efficiency and reduce operating costs

With the construction season fast approaching, city dwellers will start to notice those familiar towering metal constructs commonly known as cranes lift and lower objects of various weight, shapes and sizes throughout the summer. The process of selecting an appropriate crane for a particular job is not as easy as one would think however. Selection is based on a number of criteria including site characteristics, the nature of a given load, budget constraints, safety regulations and environmental factors to name but a few.

In 1996 a research team headed by Dr. Sabah Alkass, Associate Professor at the School for Building (SFB), developed a project in collaboration with Guay Inc., one of the largest crane rental companies in North America, to design and implement a software package capable of advising users in selecting the most cost-effective crane for a particular job while satisfying other criteria including safety. This work is a continuation of research conducted by Dr. Alkass and graduate students in 1993.

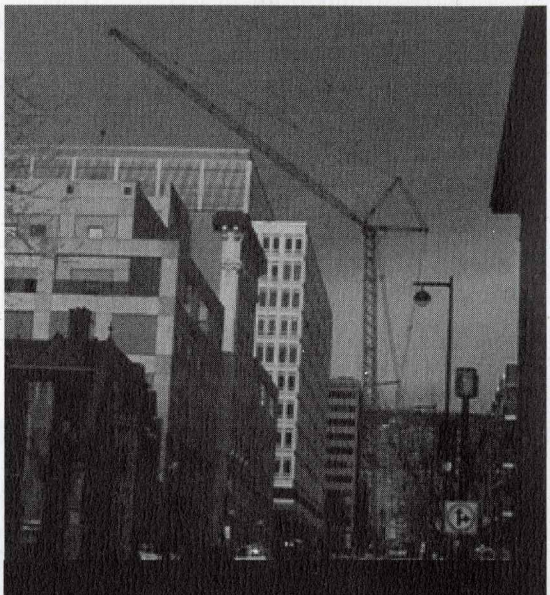
Traditionally, specialists would choose cranes taking into account most variables, however their final selections were not always the most efficient from a budgetary standpoint. According to Dr. Alkass, selecting the most cost-effective crane for a given project was often a hit or miss proposition. On occassion larger, more expensive cranes would be selected to do the work that a less expensive crane could have easily accomplished. Within a matter of minutes this program can provide the user with a list of cranes suited to complete a job, once specific parameters have been inputed.

The program is also capable of generating a 3-D image of the selected crane along with the surrounding environment to simulate crane movements in order to find the safest and most efficient area to position the crane. The software package allows users to simulate the various possible placements beforehand to avoid potential on site errors in placement as well as to assess the feasability of the job itself.

In addition to saving companies money, the program also significantly improves the speed at which this work is done. Specialists usually require an architect to render images on autocad which can take several weeks in comparison to the half day required by the program. With la Commission de la santé et de la sécurité de travail's favouring of 3-D imaging, the efficiency of this software package becomes all the more important.

The project has been supported by NSERC and GUAY Inc. through a Collaborative Research & Development (CRD) Grant totalling close to $300,000 over a three-year period. CRD Grants help Canadian companies compete internationally while promoting practical research within Canadian Universities. In addition, GUAY Inc. also provides researchers for this project with technical support provided by their experts.

Dr. Alkass points out that this entire project has been fueled by the hard work and dedication of students. No external professionals were recruited to assist in developing the program. The research team itself is composed of Dr. Alkass, Dr. Osama Moselhi, Chair of the SFB, and research associate Mohamed Al-Hussein who participated in designing the system and is also conducting his Ph.D. research while working on the project. Additional team members include three undergraduate co-op students, two of whom have already completed their work terms. The third co-op student, Graham Harrison, is an exchange student from the University of Northumbria in England and is currently working on the implementation stage of the project. Two additional co-op students will join the team shortly.



Crane used to replace boiler and cooling tower from Concordia's Hall Building Service room was selected using computer program developed at School for Building

Now in its final year, researchers are in the process of filling the program's data base with specs on all cranes owned by GUAY Inc.. This marks the largest database ever compiled in this area. In July the team will conduct training sessions at the company to teach workers how to run the program and will begin on-site work.

For further information on this project please contact Dr. Sabah Alkass at (514) 848-3197 or via e-mail: alkass@cbs-engr.concordia.ca

Concordia and CAE sign Agreement of Academic Cooperation

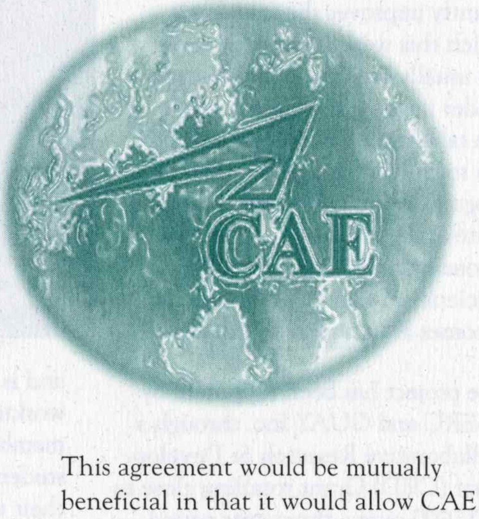
Agreement calls for collaborative research and professional training between Concordia, Ain Shams University in Egypt and Canadian high-tech company

May 13, 1998 marks the date Concordia University and CAE Electronics will officially formalize an Agreement of Cooperation in the areas of collaborative research and academic training with Ain Shams University in Cairo, Egypt.

The agreement itself specifically calls for the training and professional development of students and faculty at Ain Shams University in the area of software and computer engineering. Concordia will provide visiting graduate students and faculty with the appropriate academic training while CAE will offer paid internships in a field related to their academic studies.

The work offered by CAE will be an integral part of student and faculty training while complementing their programme of study at Concordia. Concurrently, selected areas of study will be in a field or area pertinent and beneficial to CAE. Financial compensation by CAE would be in the form of a bursary or scholarship to help students offset their living expenses while in Canada.

According to Dr. Nabil Esmail, Dean of the Faculty, "Engineering and computer science students in Egypt, in terms of theoretical knowledge are at par, if not stronger than their North American counterparts. Their applied knowledge is inferior however, due to the lack of appropriate facilities and technologies available to them".



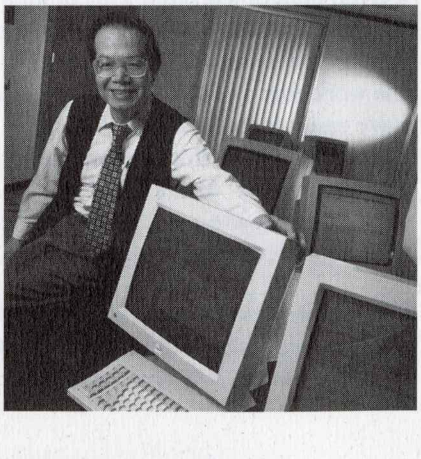
This agreement would be mutually beneficial in that it would allow CAE to benefit from Ain Sham's students' and faculty's strong theoretical training while providing them with the practical applied experience they seek.

As a leader in the field of electronics and flight simulators, CAE was a logical choice as industrial partner in this agreement. In fact, CAE has recently supported Concordia's new upcoming software engineering programme and will likely offer internships to students in the programme while supplying equipment for Concordia's software engineering labs. This initiative adds to the already strong relationship developing between both parties.

While the agreement currently focuses on areas of mutual interest in the fields of software and computer engineering, there is a distinct possibility for expansion to other fields in the future. In addition, the proposed programme of collaboration will eventually be extended to other universities having academic ties to Concordia. With respect to the Middle East, this includes the Jordan University of Science and Technology and the Technion-Israel Institute of Technology.

On May 13,1998 the official letter of agreement will be signed by Mr. James Cherry, CEO for CAE Electronics, Concordia Rector and Vice-Chancellor Dr. Frederick Lowy and Dr. Balbir S. Sahni, Director for Concordia's Centre for International Academic Cooperation.

Faculty member honoured by Concordia



Computer Science professor Ching Y. Suen was awarded the 1998 Concordia University Research Fellows Award in a reception held last March for his dedication and ongoing commitment to research in the field of pattern recognition and machine intelligence. Dr.Suen has become one of the top research scientists in Canada and holds the highest NSERC individual research grant at Concordia. Besides chairing several societies as well as national and international conferences in his field, Dr. Suen has a prolific publication record which includes numerous journal papers, conference proceedings and reports. The Concordia Research Fellows Award is awarded anually to recognize top researchers as well as promote research within the University.

Faculty News

March-April 1998 Faculty of Engineering & Computer Science Concordia University

Major Donation Helps Support Research at School For Building

A $1 million dollar gift to Concordia's Capital Campaign from the Edith and John Low-Beer Foundation will enable Concordia to assume a leadership role in determining how the construction of buildings affects the environment and human health.

The gift will help establish Canada's first research centre on the environmental impact of building materials. According to Dr. John Campanelli, Assistant Professor in Civil Engineering at the School for Building (SFB), this research centre will bring together experts from the SFB and from the Department of Biology at Concordia, as well as engineers from McGill and representatives from industry.

"This is a very generous gift that recognizes the strengths of Concordia's School for Building and the researchers working here", stated Dr. Campanelli. "It enables Concordia to direct a series of very important research initiatives involving other universities and private industry".

The need for this type of research has grown dramatically over the past 30 years. Today, modern buildings have become almost completely air-tight in their bid to improve energy efficiency in heating and air-conditioning. As a result, numerous buildings exhibit what is commonly known as "sick building syndrome" in which air quality and circulation becomes poor and, subsequently, creates an adverse effect on office worker health.

Besides health-related problems, environmental concerns regarding the disposal of PVC products, the most widely-used plastics in buildings, will also be studied.

Clara Paradisis Appointed Executive Assistant to the Dean

Clara Paradisis has been appointed Executive Assistant to the Dean, effective February 16, 1998. A graduate of Concordia, she has worked in the Audio-Visual Department for the past 18 years, most recently as Assistant to the the Director and Coordinator of Open and Distance Learning.

Dr. Ted Stathopoulos Recognized by the American Society of Civil Engineers (ASCE)

Dr. Ted Stathopoulos, Associate Dean and Professor at Concordia's School for Building, recently received an award for the best paper published in the American Society of Civil Engineers (ASCE) Journal of Aerospace Engineering in 1996. The paper is titled "Wind-Tunnel Studies of Buildings and Structures".

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Please send submissions and comments to
Michael Lennane
1455 Demaisonneuve W. Montreal, Quebec,
Canada LB 1009-1
(514) 848-3073
mike@encs.concordia.ca

Dr. Christopher Jackson
Dean, Fine Arts
S-VA 250